

REMARKS

Claims 23-24 and 27-44 are pending in the application; claims 25 and 26 have been canceled with the instant amendment.

Claim Objections

In claim 30 the spelling error has been corrected.

Claim Rejections - 35 U.S.C. 112

Claim 31 stands rejected under 35 U.S.C. 112, 2nd paragraph, as being indefinite. In view of examiner's remarks, claim 31 has been amended to depend from claim 23.

Rejection under 35 U.S.C. 103

Claims 23-30, 32, 33 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Worch et al.* (WO 98/17844) in view of *Bittner* (EP 0 391 608).

Claim 31 stands rejected under 35 U.S.C. 103(a) as being unpatentable over *Worch et al.* (WO 98/17844) in view of *Bittner* (EP 0 391 608) and *Wengel et al.* (US 6,670,461).

Claims 34-36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Worch et al.* (WO 98/17844) in view of *Bittner* (EP 0 391 608) and *Yabusaki et al.* (WO 85/02628).

Claim 23 has been amended to include the features of claims 25 and 26. A metallic object is now claimed that comprises a coating that is comprised of a thin metal oxide layer and nucleic acid compounds selected from the group consisting of nucleic acids and nucleic acid derivatives. The nucleic acid compounds have 5'-terminal or 3'-terminal ends with a covalently bonded anionic group, selected from the group consisting of phosphate, phosphonate, and sulfonate. The nucleic acid compounds each are bonded to the thin metal oxide layer through the covalently bonded anionic group of the 5'-terminal or 3'-terminal ends and the remainder of the nucleic acid compounds extends away from the thin metal oxide layer, wherein the 5'-terminal or 3'-terminal ends are embedded in the metal oxide layer grown about the 5'-terminal or 3'-terminal ends.

Worch is cited to disclose a metallic object with a coating that is comprised of a thin metal oxide layer and an inorganic and/or organic component wherein the organic component can be a biomolecule and/or oligomers. The organic component can be incorporated into the metallic oxide phase and can extend beyond the polyphase oxide.

Bitner is cited as disclosing a solid support comprising metal oxide with a coating of a thin metal oxide layer and nucleic acid incorporated into the metal oxide layer; examiner refers to page 3, lines 22-23, in regard to the incorporation.

With regard to claims 25 and 26 the examiner argues that the phosphate backbone of DNA molecules plays a significant role in sorption of DNA molecules as evidenced by page 5, lines 32-33, of *Bitner*.

As stressed before by Applicant, *Bitner* only teaches adsorption and not incorporation or embedding into a metal layer as the adsorbed nucleic acids are desorbed again.

Bitner discloses that the phosphate groups of the DNA backbone may play a significant role in the sorption of the nucleic acids to the metal oxide (page 5, lines 32-33) so that the disclosure of *Bitner* teaches sorption by way of backbone rather than by 5'-terminal or 3'-terminal ends.

In order to achieve the initial sorption effect according to the present invention the terminal ends are provided with anionic groups such as phosphates, phosphonates or sulfonates (see page 8, 2nd and 3rd full paragraphs, of the specification). The reference *Bitner* does not teach that the DNA should be provided at the terminal ends with such anionic groups in order to effect sorption.

Claim 23 as amended by the features of claims 25 and 26 does not claim the backbone being "incorporated" (adsorbed or bonded) but the 5'-terminal or 3'-terminal ends of the nucleic acid derivatives. The 5'-terminal or 3'-terminal ends of the nucleic acid derivatives and not the backbone are bonded to the surface according to the present invention by way of the anionic groups that are covalently bonded to the 5'-terminal or 3'-terminal ends, meaning that the nucleic acid derivatives according to the invention extend essentially perpendicularly away from the surface of the metallic object.

Moreover, the instant specification sets forth (see page 19) based on the presented

embodiments and examples, that nucleic acids that are not modified as claimed in claim 23 cannot be immobilized by adsorption on a TiAl6V4 surface in detectable amounts (examples 2, 3, 7, 8); that 5'-phosphorylated nucleic acids can be stably immobilized by anodic polarization at pH 4.0 on a TiAl6V4 surface and the 3'-terminal molecule areas are freely accessible for subsequent hybridization (example 1); that nucleic acids that are not terminally phosphorylated cannot be immobilized by anodic polarization at pH 4.0 on a TiAl6V4 surface in detectable amounts (examples 4, 5, 6, 9). Applicant has therefore demonstrated the importance of the features as claimed.

Bitner teaches in contrast to the ends of the DNA being adsorbed that the DNA backbone is adsorbed, i.e., the DNA strands are adsorbed across their length and not with one of their ends. *Bitner* teaches thus that the DNA would extend parallel to the surface of the metallic object and this would mean that in a process according to *Worch* the metal oxide layer would cover the DNA strands extending parallel to the surface to be coated.

Thus, the features of claim 23 defining that nucleic acid compounds each are bonded to the thin metal oxide layer through the covalently bonded anionic group of the 5'-terminal or 3'-terminal ends and the remainder of the nucleic acid compounds extends away from the thin metal oxide layer, wherein the 5-terminal or 3'-terminal ends are embedded in the metal oxide layer grown about the 5'-terminal or 3'-terminal ends is not obvious in view of *Worch* and *Bitner*.

DOUBLE PATENTING REJECTION

Claims 23-36 stand rejected on the ground of obviousness-type double patenting over claims 1-9 of US 6,524,718.

This reference does not disclose that nucleic acid compounds having 5'-terminal or 3'-terminal ends with a covalently bonded anionic group, selected from the group consisting of phosphate, phosphonate, and sulfonate, are bonded to the thin metal oxide layer through the covalently bonded anionic group of the 5'-terminal or 3'-terminal ends and the remainder of the nucleic acid compounds extends away from the thin metal oxide layer, wherein the 5-terminal or 3'-terminal ends are embedded in the metal oxide layer grown about the 5'-terminal or 3'-terminal ends.

The reference mentions biomolecules but does not suggest based on the disclosure

of "biomolecules" that nucleic acid derivatives with covalently bonded anionic groups at the 5'-terminal or 3'-terminal ends are embedded in the way claimed in claim 23.

CONCLUSION

In view of the foregoing, reconsideration and withdrawal of the rejection of the claims are respectfully requested. It is submitted that this application is believed to be in condition for allowance and such allowance is respectfully solicited.

Should the Examiner have any further objections or suggestions, the undersigned would appreciate a phone call or **e-mail** from the examiner to discuss appropriate amendments to place the application into condition for allowance.

Authorization is herewith given to charge any fees or any shortages in any fees required during prosecution of this application and not paid by other means to Patent and Trademark Office deposit account 50-1199.

Respectfully submitted on April 15, 2009,

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